Instructions on Maintenance of the Telegraph and Telephone Plant

The Pennsylvania Railroad
Specification GST-3003
December 7, 1925
Purpose

A-1 These instructions are intended as a guide to employees who maintain the Railroad Company's telegraph and telephone plant. They outline the duties and routine to be followed in ordinary replacements, inspection and repair of pole lines, wires, cables, offices and associated equipment.

Responsibility

B-1 A Telegraph and Signal Foreman, in addition to his duties as covered in Rule 827—Book of Rules, must see that the telegraph and signal maintainers assigned to telegraph and telephone work under his supervision are given the proper instructions and information covering the plant they are to maintain. He must caution his men to exercise great care to avoid injury to themselves and others.

B-2 A Telegraph and Signal Maintainer, unless otherwise provided, reports to and receives orders from the Telegraph and Signal Foreman in his district. In addition, he will be guided by the instructions of the Wire Chief or other designated employee in charge of wire testing when clearing wire or other troubles in connection therewith.

General

C-1 Employees directly responsible for the condition of the telegraph and telephone plant shall observe the following:

C-2 They shall patrol, frequently, the districts assigned them to assure themselves that everything is in proper working order and to do such minor repair work as may be necessary. They shall notify the Telegraph and Signal Foreman of any conditions which they are unable to handle alone.

C-3 They shall inspect, carefully, the entire plant as often as is necessary, making requisite record and report of all needed repairs and replacements.

C-4 They shall at all times, in covering their territory, try to anticipate conditions which would interrupt the service. Such conditions should be corrected before trouble develops.

C-5 They shall be equipped, when on duty, with the proper tools and supplies for ordinary repairs to the wires and equipment under their charge.
C-6 They shall carry with them such permits for their work as are required by municipal or other authorities in their territories.

C-7 They shall have the permission of the owners or their agents before placing poles, stubs or anchors on private property, before stringing wires or cables over such property or before trimming trees or making attachments to trees or buildings not controlled by the Railroad Company.

C-8 They shall endeavor to keep poles free from advertising matter and from any unauthorized attachments by foreign wire-owning companies or by individuals.

C-9 They shall report all cases of prospective foreign line construction which will cross over or under or closely parallel the lines in their care and all unsafe conditions which may develop at existing crossings or parallels.

C-10 They shall bring to the attention of the proper authority such matters as may come to their knowledge which in any way would be advantageous to the Company's service or which might adversely affect the Company.

C-11 They shall acquaint themselves with a clear understanding of the requirements called for by these instructions and by such other instructions and specifications as may be furnished them, which should cover all branches of the plant they are required to maintain.

C-12 Conditions sometimes arise where specifications and instructions cannot be applied directly and in such cases maintenance forces must use their best judgment. This is particularly true in connection with repairs to present lines and equipment not constructed under existing standards. Full life should be obtained from all plant wherever practicable.

**Maintenance**

**Pole and Wire Lines**

D-1 The following paragraphs include general instructions on maintaining the pole and wire lines.

D-2 Pole lines shall be inspected and repaired systematically, all poles badly decayed or otherwise defective being reset, reinforced or replaced and leaning poles being straightened.

D-3 Guyed poles shall be watched closely and defective guys or poles renewed before they give or break.
D-4 In resetting, poles shall be placed in line and to the depth called for in Pole Line Construction Specifications. Shallow settings in connection with temporary repairs shall be corrected at the first opportunity.

D-5 When using a block and tackle attached to one of the line poles, to erect or lower a pole, the line pole should be guyed or braced, temporarily, to hold the load instead of placing the strain on the line wires.

D-6 Crossarms, braces, pins, insulators and line and tie wires, etc., shall be renewed as conditions require. Crossarms and transposition brackets out of position shall be straightened and tightened.

D-7 Insulators on phantom circuits should be of the same type on all four wires. Insulators badly coated with dirt, broken insulators or insulators defective in other ways may cause very low insulation during unfavorable weather and prevent the wires from working satisfactorily. All such insulators should be replaced at once on important long distance circuits.

D-8 Copper wire always shall be handled so as to avoid kinks, bends or other injury to the wire surface. In removing slack, pulling guys, resetting poles, etc., care shall be used not to have the line wires too tight. Emergency hand joints in copper wire shall be cut out and replaced with sleeve joints. Iron wire joints shall be soldered. Any span having four or more joints should be replaced with new wire.

D-9 When doing work that requires untying the wires on a composite or phantom composite circuit, the wires should not be laid on the crossarm as any unbalanced insulation conditions will make the lines noisy and possibly unfit for service.

D-10 When changing crossarms, pulling slack or stringing wire, care should be exercised not to allow the wires to swing together as it interrupts the service and is very annoying to persons talking over the wires.

D-11 When necessary to cut working wires, the steel pulley grips should be jumpered temporarily with a piece of insulated wire in order not to interrupt the service. If insulated wire is not available, copper line wire can be used connecting it outside the grips to the line wires.

D-12 Line wires shall be cleared of kites, limbs of trees, pieces of wire, etc., which may become entangled in them.
D-13 In trimming trees and brush, a clearance of not less than 18 inches from the line wires shall be provided. It is advisable that this clearance be 4 feet and that the cutting be done during the winter months.

D-14 Climbers should be removed in climbing shade and fruit trees and also when working on buildings.

Cables, Messengers and Conduits

D-15 Aerial cables and their messengers and the rings or ties shall be closely watched and kept in a safe condition at all times, special care being given to crossings over the railroad tracks or highways. See CE 43-(a).

D-16 Underground installations shall be examined periodically. Manholes, conduit and laterals shall be maintained in a good state of repair. Cables shall be properly racked. Manholes should be kept free of mud, rubbish and water, as far as practicable. Where it is considered advisable, manhole covers shall be equipped with locks.

D-17 Both aerial and underground cable systems shall be tested frequently for electrolysis by those assigned to such work and the results reported on Forms CT 1517 and 1518. Where electrolytic conditions require them, drainage wires, bond wires and insulating joints shall be provided per recommendations of proper authority.

D-18 Cable boxes and test houses and their equipment and wiring shall be maintained in the proper manner, those having protectors shall contain a supply of spare fuses. Cable boxes or test houses not under the close observation of telegraph and signal maintainers shall be provided with locks. Distributing box doors shall be kept securely fastened. All cable boxes and test houses of wood, particularly where exposed to the weather, shall be painted at frequent intervals when their conditions require it. Bridle wires or weatherproof cable, exposed on terminal poles, shall be painted periodically with a coat of approved outside varnish.

D-19 Foreign owned wires on the telegraph and telephone pole line that are maintained by the Railroad Company's forces shall be given the same class of maintenance as Railroad owned wires, except for emergencies as covered in E-2. All material consumed in such work shall be reported to the proper authority in order that the foreign company will be billed for it.
Inside Plant

D-20 All telegraph and telephone apparatus shall be inspected as opportunity affords, particular attention being given to parts where trouble most frequently occurs, such as selector keys, foot-switches, receiver cords, fuses and carbons, etc. The maintainer in doing this work should have with him such spare parts as are most frequently required.

D-21 In addition, the equipment shall be cleaned, overhauled and tested at regular intervals to ascertain if it is in proper operating condition and rendering the service required. Loose screws and connections shall be tightened, contacts adjusted, run down batteries renewed, and badly worn or defective wiring or parts repaired or replaced, etc.

D-22 Selectors should not be adjusted or regulated until the maintainer is definitely certain that the trouble is in the selector as most selector failures are caused by the selector key being too fast or too slow. Selectors should never be oiled.

D-23 Selector keys shall be examined closely for sticking. The time required for the operation of the key shall be checked at regular intervals. The normal time for the revolution of the different types varies, but all keys of the same type shall be adjusted alike. If keys are noisy in operation a small amount of watch or other light oil will help. Under no circumstances shall other than a very light oil be used, as heavier oils tend to become gummy, slowing up the key and causing selector failures. Care must be taken not to use too much oil. The proper amount to apply at any one place would be that which would remain on a pin point when dipped in the oil.

D-24 All fuses, carbons and micas should be inspected and the carbons cleaned at regular intervals, particularly after lightning storms. Dirty carbons and loose fuses cause noisy lines.

D-25 Frequent “Listening-in” tests on telephone circuits should become a habit with those responsible for their operation. Telegraph and printer induction, slight grounds and escapes, poor transmission from the individual station and other slight annoying features are signs of weak spots and should be corrected before they develop into actual interruptions to the service. Office troubles reported through Wire Chiefs or other employees, designated as in charge of wire testing are, usually, an indication of poor inspection.
Emergency

E-1 Where service is seriously interrupted, it should be restored by the quickest and most practicable method that is applicable to the existing conditions. The repairing of broken wires and the use of existing poles should be given first consideration. If it is found that greater progress can be made, available twisted pair or emergency cables shall be used. See GST-3002A.

E-2 Unless otherwise instructed, wires shall be restored in the following order:

1st, Train Wires
2nd, Block Wires
3rd, Signal Wires (where practicable)
4th, Trunk or Through Wires (including W. U. wires on jointly owned lines)
5th, Local Telegraph or Telephone Message Wires
6th, Crossing Bell Wires
7th, Watchman's Warning Bell Wire
8th, Tap Bell Circuits
9th, Local Telephone Lines
10th, Foreign Wires on Railroad Company's Poles.

E-3 Where train or block wires, etc., are so located on cross-arms that, if strung in their permanent locations, they will be interrupted by other wires strung above them, the wires on the crossarms above should be strung first and used for patching lower circuits. In terminals and yards, where all service is of equal importance, wires should be restored in whatever order the greatest headway can be made.

E-4 Men assigned to districts to close gaps should keep in touch with headquarters or the Foreman in charge, in order that they may receive sufficient material, or be transferred when the work assigned them is completed.

E-5 Maintainers, looking after the office cables and inside plant equipment, should make a careful inspection of all protectors, apparatus, etc., to be sure they are in working order and ready for service when line wires are restored.

Tools and Material

F-1 Maintenance forces shall have their storerooms clean and orderly, keeping tools and material properly racked and shelved. The storeroom doors shall be provided with locks.
F-2 Tools shall be in good condition. Edged tools, saws, bits and digging bars must be kept sharp. Pliers, connectors, buffalo grips, etc., should be kept free from rust and well oiled. Leather straps and belts shall be kept pliable by the use of a good leather dressing. Ropes shall be properly coiled and hung on racks or hooks so that they will keep dry. Tools worn out or considered unsafe shall be replaced.

F-3 Motor, hand and push cars shall be maintained in a good state of repair. When not in use, they shall be protected from the weather and from theft. Maintenance forces shall not permit any unauthorized person to ride on any car assigned to their care.

F-4 Material shall be so kept, wherever practicable, that the amount on hand can be counted without unpacking it.

F-5 All due care shall be used not to waste or lose material. When a job is finished, fit material shall be collected and returned to the storeroom. Junk material of any value shall be gathered up and handled through the regular channels. Worthless junk shall be buried or otherwise disposed of in a proper manner.

Correct:

J. C. JOHNSON,
General Superintendent Telegraph.

- Approved:

C. M. SHEAFFER,
Chief of Transportation.

Philadelphia, Pa.,
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